

REMARKS

Amendments

Claim 13 is amended to correct an obvious typographical error.

Rejection under 35 USC 103(a) in view of Lockett et al and Agrawal et al. (US '744)

Claims 1, 2, and 5-20 are rejected as allegedly being obvious in view of Lockett et al. (US 5,339,648) taken in combination with Agrawal et al. (US 6,240,744). This rejection is respectfully traversed.

The disclosure Lockett et al. (US '744) corresponds to the disclosure of the EP 0 638 778 discussed in applicants' specification in the text bridging pages 2-3. As illustrated in Figure 1, Lockett et al. disclose a distillation system comprising a high pressure column 1 and a low pressure column 2. The low pressure column 2 includes a longitudinally partitioned region 4 having a first section and a second section. Air is introduced into the bottom of the high pressure column 1. Vapor is removed from the top of column 1 via line 6, passed into condenser 7, and then a portion is sent to the top of column 2 as reflux via line 8 and another portion is introduced as reflux into the top of column 1 via line 9. Liquid removed from the bottom of column 1 is introduced into the first section of the partitioned region 4. Vapor product is removed from the top of column 2 via line 14 and liquid product is removed from the bottom of column 2 via line 15.

An argon stream and a waste stream are also removed from column 2. Specifically, these two streams are removed from the partitioned region 4. The crude argon stream having an argon concentration of at least 70% is removed from the second section of the partitioned region 4 via line 12. The waste stream is removed from the first section of the partitioned region 4 (i.e., the same section in which the liquid from the bottom of column 1 is introduced) via line 13.

Lockett et al. disclose that the distillation system is operated to enhance the concentration of crude argon product withdrawn from the second section of the partitioned region 4. In particular, the liquid to vapor molar flow rate ratio is set such that the flow rate of liquid introduced into the second section of the partitioned region 4 is selected to result in most of the nitrogen in the liquid is vaporized by the rising vapor before the liquid reaches the

point at which the crude argon stream is withdrawn via line 12. If the liquid flow rate is too high, Lockett et al. disclose that this will result in excessive nitrogen in the crude argon. If the liquid flow rate is too low, Lockett et al. disclose that this will result in excessive oxygen in the crude argon. See column 4, line 60 – column 5, line 11.

As noted above, Lockett et al. remove a crude argon stream having an argon concentration of at least 70% from the second section of the partitioned region 4 via line 12. Lockett et al. provide no disclosure or suggestion of removing an argon stream having an argon concentration of 15% and 50% from either section of the partitioned region.

The rejection alleges that it is a mere matter of design choice to obtain an argon stream having an argon concentration of 15% and 50%. However, there is no support for this allegation. The system of Lockett et al. is specifically designed to achieve a stream having an argon concentration of at least 70%. As discussed above, Lockett et al. operate the second section of the partitioned region 4 with a certain liquid to vapor molar flow rate ratio as to obtain the desired argon concentration in the withdrawal stream 12.

Nothing in the disclosure of Lockett et al. or in the rejection provides any rationale as to why one would modify the system of Lockett et al., in direct contradiction to the disclosure of Lockett et al., so as to obtain an argon stream having a **lower** argon concentration.

Agrawal et al. (US '744) disclose a distillation system for separation of air and the production of an argon-enriched stream. As shown in Figure 1, the system comprises a high-pressure column 103 and a low-pressure column 121. Figure 1 shows three distillation sections in low-pressure column 121, i.e., bottom distillation section 123, intermediate distillation section (125 and 127), and apparently a top distillation section illustrated above the intermediate distillation section.

The intermediate distillation section is divided into subsections 125 and 127 by a vertical separating element 129 and an end separating element 131. The gaseous stream 133 exiting the bottom distillation section 123 is split into two portions, 135 and 137. First portion 135 flows into intermediate distillation subsection 127, whereas second portion 137 flows into the so-called partitioned section, subsection 125. There is no barrier preventing gases exiting intermediate distillation subsection 127 from flowing into the top distillation section. However, end separating barrier 131 prevents fluid flow between partitioned section 125 and the top distillation section. Instead, an argon-enriched gas stream 139 is removed

from the top of partitioned section 125, and partially condensed by heat exchange. Thereafter, a portion of the argon-enriched stream is removed from the system as stream 145 and another portion of the argon-enriched stream is returned as reflux to partitioned section 125.

Thus, partitioned section 125 of the intermediate distillation section is not in fluid communication with the top distillation section of the low pressure column. Hence, the partitioned intermediate distillation section of the system of Agrawal et al. (US '744) operates in a substantially different manner than the partitioned region of the system of Lockett et al.

The rejection points to certain portions of the disclosure regarding the component concentrations of certain streams. At column 7, lines 46-50, Agrawal et al. (US '744) disclose that if partitioned section 125 has 20-25 stages than the **oxygen** concentration of the argon-enriched stream is "nominally 10 mole % but may range from 3 mole % to 60 mole %." This relates to an argon stream removed from a partitioned section which operates in a substantially different manner than the partitioned region of the system of Lockett et al. and thus provides no reason to modify the system of Lockett et al. Moreover, the mere possibility that a differently arranged system achieves a lower, seemingly less desirable argon concentration provides no rationale to modify the system of Lockett et al. in a manner that is directly contrary to the function thereof and directly contrary to the teaching of Lockett et al.

The disclosure regarding the argon concentration of vapor stream 133 (column 7, lines 25-29) concerns a vapor stream that is to be introduced into the subsections 125 and 127. It does not relate to an argon stream removed from a partitioned section. Moreover, the concentration of this stream provides no rationale to modify the system of Lockett et al. in a manner that is directly contrary to the function thereof and directly contrary to the teaching of Lockett et al.

In view of the above remarks, it is respectfully submitted that the disclosure of Lockett et al., taken alone or in combination with that of Agrawal et al. (US '744), fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Agrawal et al. (US '742) and Agrawal et al. (US '744)

Claims 1-3 and 5-12 are rejected as allegedly being obvious in view of Agrawal et al.

(US 5,970,742) taken in combination with Agrawal et al. (US 6,240,744). This rejection is respectfully traversed.

In the rejection, it is asserted that Agrawal et al. (US '742) discloses the 'basic inventive concept' of applicants' claimed invention, referring to Figures 5 and 12, except for a stream having the argon concentration of 15-50%. Applicants respectfully disagree with this assertion.

Figure 5 of US '742 shows a distillation system having two columns, i.e., column 100 and column 200. The first column is connected to the second column on the gas and liquid sides (lines 32 and 22). The second column is also connected to the first column on the gas and liquid sides (lines 27 and 37). Figure 5 does not, however, disclose a rectification system having first, second and third rectifying sections arranged in series, wherein the first and second rectifying sections are connected to one another on the gas and liquid sides, and the second and third rectifying sections are connected to one another on the gas and liquid sides, and wherein the second rectifying section has two subsections, which are not connected to one another on the gas and liquid sides and are arranged in a parallel manner.

Figure 12 of US '742 also shows a distillation system having two columns, i.e., column 100 and column 200. The first column is connected to the second column on the gas and liquid sides (lines 50 and 60). The second column is also connected to the first column on the gas and liquid sides (lines 62 and 52). However, as with Figure 5, Figure 12 does not disclose a rectification system having first, second and third rectifying sections arranged in series, wherein the first and second rectifying sections are connected to one another on the gas and liquid sides, and the second and third rectifying sections are connected to one another on the gas and liquid sides, and wherein the second rectifying section has two subsections, which are not connected to one another on the gas and liquid sides and are arranged in a parallel manner.

Thus, neither Figure 5 nor Figure 12 provides any suggestion of the rectification system of applicants' invention.

Agrawal et al. (US 744) is discussed above. US '744 describes a distillation system having a partitioned section 125 of the intermediate distillation section which is not in fluid communication with the top distillation section of the low pressure column. None of the Figures of US '742 illustrate a partitioned intermediate distillation section.

The rejection points to certain portions of the disclosure regarding the component concentrations of certain streams. At column 7, lines 46-50, US '744 disclose that if partitioned section 125 has 20-25 stages than the **oxygen** concentration of the argon-enriched stream is "nominally 10 mole % but may range from 3 mole % to 60 mole %." This relates to an argon stream removed from a partitioned section, a structure which is clearly absent from the disclosure of US '742. Thus, this disclosure provides no suggestion of modifying the disclosure of US '742 in such a manner as to arrive at an embodiment of applicants' claimed invention.

The disclosure regarding the argon concentration of vapor stream 133 (column 7, lines 25-29) concerns a vapor stream that is to be introduced into the portioned region of subsections 125 and 127. The concentration of this stream provides no rationale to modify the system of US '742 in such a manner as to arrive at an embodiment of applicants' claimed invention.

In view of the above remarks, it is respectfully submitted that the disclosure of Agrawal et al. (US '742), taken alone or in combination with that of Agrawal et al. (US '744), fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,
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